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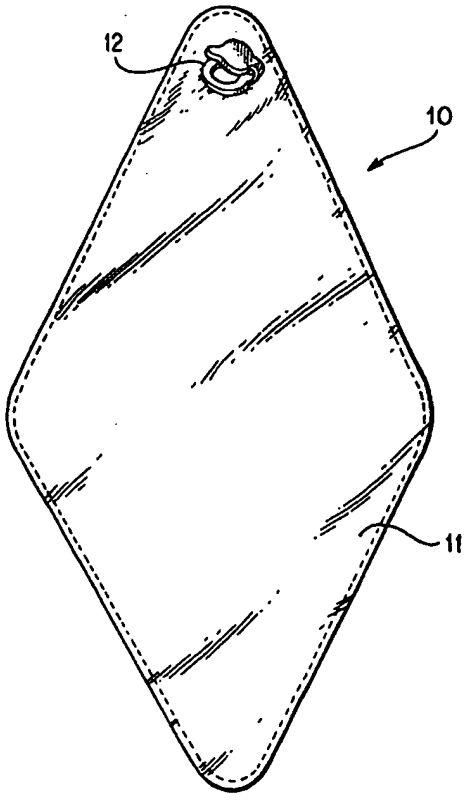
(54) Title: METHOD FOR BLOCKING PASSAGES AND THE CAVITY FILLING BAG

(57) Abstract

A bag (10) is formed of a flexible material which may be inserted into a cavity (31) of a vehicle (20) and inflated to block the flow of powder, gas and/or fluids and to restrict vibration and dampen noise.



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METHOD FOR BLOCKING PASSAGES AND THE CAVITY FILLING BAG

Field of the Invention

This invention relates to a bag or bladder for filling cavities for deadening vibrations, stiffening body panels, blocking a passage and an improved method thereof. In one aspect, the present invention is related to a gas filled bag adapted to fit in an open space or cavity in vehicles, recreational vehicles, boats and other related devices to block passages (against the passage of air, dust and fluids), provide buoyancy, dampen vibrations, and stiffen body panels adjacent to the bladder which improves NVH (noise, vibration and harshness) values and reduces the tendency of the panels to deform under an applied pressure.

Description of the Prior Art

The prior art is replete with teachings of inflatable bags, for example dunnage bags, used in shipping to fill or bridge the space left between the freight and the walls of the freight carrying compartment, see U.S. Patents Re. 27,787, 3,199,689, 3,426,891, 3,667,625 and 4,553,887. U.S. Patent 2,907,580 also illustrates the use of an inflatable bag for holding down the load in the trunk of an automobile. This patent also discusses the fact the bag should be fairly thin so that it may flex sharply without cracking, that it should be mechanically very strong, substantially air tight and abrasion resistant. Examples of materials are given.

In the field of the present invention, foams or preformed panels of plastic or rubber-like materials are used in the construction of vehicles and boats to provide barriers, sound and vibration dampening and buoyancy. Construction by robotics techniques have resulted in designs to reduce the amount of labor involved and have increased the size of the units joined in the manufacture of such devices. Further, the techniques for automatically welding the units together have generated cavities which need filling to provide a barrier for powder, gas and fluid in such cavities or passageways left after the automated construction.

Other known forms of filling cavities include the use of foaming materials, which are blown or formed in situ.

The present invention differs from the prior art in that the invention described is not a dunnage bag to hold pieces in place in the automobile or similar vehicle, or a formed integral part of the vehicle. The device and method of the present invention can be sold in the original equipment for the purpose described or in the after market to provide particularly useful accessories for some vehicles if the buyer desires.

Summary of the Invention

The present invention provides a bag or bladder and a new and improved process thereof for reducing sound transmission, vibration propagation, and general disagreeable noises, i.e., harshness (collectively termed NVH), resulting from spaces existing between panels or compartments on vehicles, stiffening adjacent body panels adjacent to the bladder which improves NVH (noise, vibration and harshness) values and reduces the tendency of the panels to deform under an applied pressure, and to block passages existing in vehicles to restrict the passage of powder, gas and/or fluids from moving through the passageway.

Harshness as used herein is a term used to describe a disagreeable noise resulting from the vehicle reacting to its environment.

Panel stiffening describes a process in which a sub-assembly of a vehicle such as a fender or door, etc., becomes more structurally sound via a more rigid alignment or joining of the parts that comprise it. The more rigid a vehicle becomes, the better the drivability becomes, and the quieter it becomes. Panel stiffening also refers to the decrease in the tendency of a panel to deform under an applied pressure when such deformable panels are not reinforced by other means.

The present invention provides a process for blocking a passageway, stiffening adjacent body panels, restricting noise, vibration and harshness, and comprises the steps of: forming an inflatable bag having a valve to permit inflation and sealing of the bag, folding the bag to a desired configuration; inserting the folded bag into a cavity where powder, gas or fluids may pass and/or which may cause noise and vibrations; inflating the bag with a gas under pressure to form the bag to the interior of said cavity; and sealing the bag.

The bag for use in the process comprises at least a pair of similar panels joined and sealed at their edges, one of said panels having a valve positioned adjacent to an edge to permit inflation of the bag and sealing of the inflated bag. The bag is formed of a gas impermeable flexible material. When inflated, the bag will follow the contour of the inside of the cavity it fills.

The bags can be a variety of shapes, though more commonly oblong or diamond shape. The sizes of the bag can also vary, from as small as 1 inch (2.5 cm.) across to as large across as the size of a body side panel.

Brief Description of the Drawings

The present invention will be further described with reference to the accompanying drawings wherein:

Figure 1 is a side elevational view of an inflatable cavity bag according to the present invention;

Figure 2 is an elevational view of a cavity bag rolled for insertion into a cavity through a preformed opening;

Figure 3 is a schematic view of the cavity bag being inflated from a cylinder of gas;

Figure 4 is a schematic view of a vehicle body having a passageway existing between the exterior panel and the bed wherein a cavity is formed;

Figure 5 is a cross-sectional view of the exterior panel and bed of the vehicle at the wheel-well showing the cavity that exists;

Figure 6 is a schematic view of the vehicle body with the cavity bag in place in the cavity to block powder, gas or fluid from passing through the passage to the cab of the vehicle; and

Figure 7 is a detail view of the vehicle bed assembly with a preformed cavity bag in position to close the cavity after the fender panel is welded to the bed assembly.

Detailed Description and Descripti n f the Preferred Embodiment

The present invention provides an improved method for sound deadening, vibration dampening, harshness reduction, and stiffening of adjacent body panels for

vehicles, i.e., automobiles, trucks, boats or airplanes, and for blocking passages in vehicles to seal the passageways against the passage of powder, gas or fluid through the passageway. Further, the present invention provides an inflatable cavity bag for blocking a passageway to restrict the egress of powder, gas or fluids through the passageway. The cavity bag of the present invention is adapted to be installed during the manufacture or as an after-market product and comprises a bag formed with at least two panels sealed together about their adjoining edges to define an inflatable bag with a valve sealed to one of the panels adjacent to an edge thereof to permit inflation of the bag and sealing the inflation gas within the bag. The cavity may be in a rocker panel, a removable access panel, column, door, roof, an opening behind a sub-assembly such as a tail lamp, a stoppered drain hole and other stoppered holes or other area as described herein.

Referring to Figure 1 of the drawing, there is illustrated a cavity bag **10** formed of a pair of panels **11**, only one of which is visible, having a generally oblong or diamond shape, with a valve **12** sealed on one panel **11**, adjacent to an edge to permit gas to be introduced into the bag and sealed therein. The bag **10** can be fabricated from polymers that are substantially impermeable to any filling gases such as nitrogen, carbon dioxide, argon and others. The polymers can include polyvinylchloride (PVC), styrene butadiene rubber (SBR), neoprene, polyesters including polyethylene terephthalate (PET) such as mylar, polyethylene, nylon and other flexible gas impermeable material which can be sealed together. Natural rubber materials and compounds may also be used. Preferably, the bag is formed of a material which is substantially gas impermeable. The panels for the bags can either be extruded, molded, cast or any other suitable methods. For the polymers that are less impermeable to gases, a thicker panel can be used, or they can be metallized to improve the impermeability, the same techniques as those employed in metallized balloons. Thus, some polymeric materials having metal coatings would also be suitable bag materials. Multiple polymeric layers can also be laminated or coextruded to form a panel to improve the gas impermeability.

The bag can be constructed with removable caps so that if gas is leaked out over years, it can be refilled. Of course, used bags themselves can also be replaced with new ones if they become ineffective or worn.

The outer surface of the panel can be treated to increase the coefficient of friction so that it can stay in place when inflated against the metal or plastic part of the vehicle. The treatment can include application of a pressure sensitive adhesive, either permanent or removable.

The shape and volume of the bag **10** may vary depending on the various needs for the bag. One example, as illustrated in Figure 1, is a bag 40 cm long by 17 cm wide with the center of a valve **12** positioned 5 cm from one end.

Figure 2 shows the bag **10** in a folded position with the edges folded or rolled inward to define a cylindrical shape with the valve **12** exposed at one end to provide access such that the bag **10** can be inserted into a cavity through an opening and then the bag can be inflated to peel the tape strips **15**, holding the bag in rolled form, to expand the bag **10** into the cavity. The tape strips **15** are short lengths of a pressure sensitive tape which will peel from the surface of the folded bag upon inflation.

As shown in Figure 3, the bag **10** is preferably inflated by a gas, such as nitrogen, from a tank **16** at a preset pressure as indicated by the pressure gauge **18** in the line **19**. The gas is inserted into the bag **10** through the valve **12** by a suitable gun or cooperating valve mating with the valve **12** on the cavity bag **10**.

The vehicle is formed with numerous cavities in the manufacture and, depending on their location, create cavities where the panels of the vehicle can even vibrate causing noises to be present in the vehicle. An example is illustrated in Figures 4, 5 and 7, where the vehicle **20** is formed with a panel **22** forming at least a portion of the bed, generally designated **24**, of a pickup type truck including a fender well **26** in the bed and forming the wall **28** over the wheel (not shown). When the decorative outer panel **30** is placed over the outer side of the panel **22** and welded thereto, a cavity **31** is formed as shown in Figure 5. This cavity **31** extends actually from the tail-light assembly **32** to the interior of the cab **33**.

As indicated in Figure 5, an opening can be formed in the panel **22** with a rubber grommet or stopper **34** in the hole. To install the cavity bag **10**, the stopper is removed and the cavity bag **10** is inserted through the hole into the cavity with the valve **12** positioned at the hole. The cavity bag is then inflated to fill the cavity at the position of

the hole in the cavity **31**. The valve **12** is then closed and the stopper replaced in the hole.

On the original equipment, a cavity sealing bag **40** may be attached to the outer side of the panel **22** as shown in Figure 7. The bag **40** is folded and deflated to allow the outer decorative panel to be placed over the panel **22** and bag **40**. After assembly, the bag **40** can be inflated through a valve (not shown), disposed at an opening in the panel **22** and accessible through the bed to inflate the bag **40**. As also shown in Figure 7, the wire harness **41** for the tail-light assembly **32** extends through the cavity **31** prior to the assembly of the outer panel onto the vehicle.

As mentioned before, such bags not only reduce sound transmission, vibration propagation, and other general disagreeable noises, i.e., harshness (collectively termed NVH), resulting from spaces existing between panels or compartments on vehicles, but also block passages existing in vehicles to restrict the passage of powder, gas and/or fluids from moving through the passageway. Surprisingly, they also stiffen adjacent body panels adjacent to the bladder, thus improving NVH (noise, vibration and harshness) values and reducing the tendency of the panels to deform under an applied pressure. This eliminates the need for reinforcing certain panels, increases the use of plastics, and gives manufacturers the option to use thinner gauge materials, either metal or plastic, in the fabrication of vehicles, as described above. This can reduce the weight of the vehicles and further improves their fuel efficiency.

Having described the present invention with reference to the several views of the drawing, what the applicant regards as the invention, including variations thereof as may come within the scope of the invention, is set forth in the appended claims.

Claims

1. A process for blocking a passageway, stiffening adjacent body panels and restricting noise, vibration and harshness comprising the steps of:
   a) providing an inflatable bag (10, 40) having a valve (12) to permit inflation and sealing of the bag;
   b) inserting said bag into a cavity (31) where powder, gas or fluids may pass and/or which may cause noise and vibration;
   d) inflating said bag with a gas under pressure to form said bag to the interior of said cavity; and
   e) sealing said bag.

2. The process of Claim 1 wherein said bag is folded to a desired configuration prior to insertion into a cavity.

3. The process of Claim 1 wherein said bag is treated to provide an increase coefficient of friction.

4. The process of Claim 1 wherein said cavity is found in a vehicle.

5. The process of Claim 1 wherein said cavity is found in a location in a vehicle selected from a group consisting of a rocker panel, a removable access panel, a column, a door, a roof, an opening behind a sub-assembly rocker panel, a stoppered drain hole and other stoppered holes.

6. The process of Claim 1 wherein said bag is adapted to be re-inflated and resealed.

7. The process of Claim 1 wherein said bag is formed of at least two panels, the panel of said bag is made by a method selected from the group consisting of casting, molding, extruding, coextruding, lamination and combinations thereof.

8. The process of Claim 1 wherein said bag is formed of at least two panels, said panels of said bags are of polymeric material.

9. The process of Claim 8 wherein said polymeric material is coated with a thin layer of metal.

10. A cavity sealing bag for blocking a passageway, stiffening adjacent body panels and restricting noise, vibration and harshness comprising at least a pair of similar panels (11) joined and sealed at their edges, one of said panels having a valve (12) positioned adjacent to an edge to permit inflation of the bag and sealing of the inflated bag.

11. A cavity bag according to Claim 10 wherein said bag is formed of a gas impermeable flexible material.

12. A cavity bag according to Claim 11 wherein said gas impermeable flexible material is a polymeric material.

13. A cavity bag according to Claim 12 wherein said polymeric material is selected from the group consisting of polyvinylchloride (PVC), styrene butadiene rubber (SBR), neoprene, polyesters, polyethylene, nylon, natural rubber and mixtures thereof.

14. A cavity bag according to Claim 10 wherein said polymeric material is coated with a metal coating.

15. A cavity bag according to Claim 10 wherein at least one of said panels of said bag is treated to increase the coefficient of friction.

16. A cavity bag according to Claim 10 wherein at least one of said pan ls of said bag is coated with an adhesive.

17. A cavity bag according to Claim 10 wherein said bag is of diamond shape.

18. A cavity bag according to Claim 10 wherein said bag is of oblong shape.

19. A vehicle having a cavity said cavity comprising a cavity sealing bag comprising at least a pair of similar panels (11) joined and sealed at their edges, one of said panels having a valve (12) positioned adjacent to an edge to permit inflation of the bag and sealing of the inflated bag.

20. A vehicle according to Claim 19 wherein said cavity is found in a location selected from a group consisting of a rocker panel, a removable access panel, a column, a door, a roof, an opening behind a sub-assembly rocker panel, a stoppered drain hole and other stoppered holes.

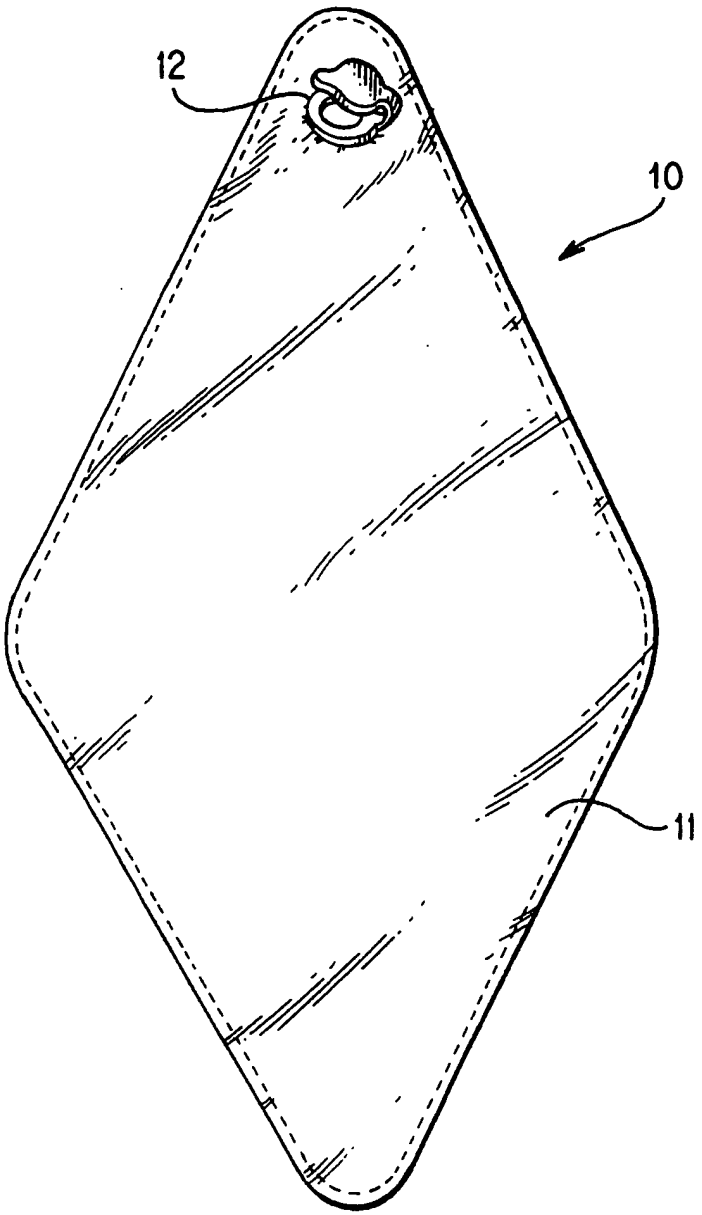

FIG. 1

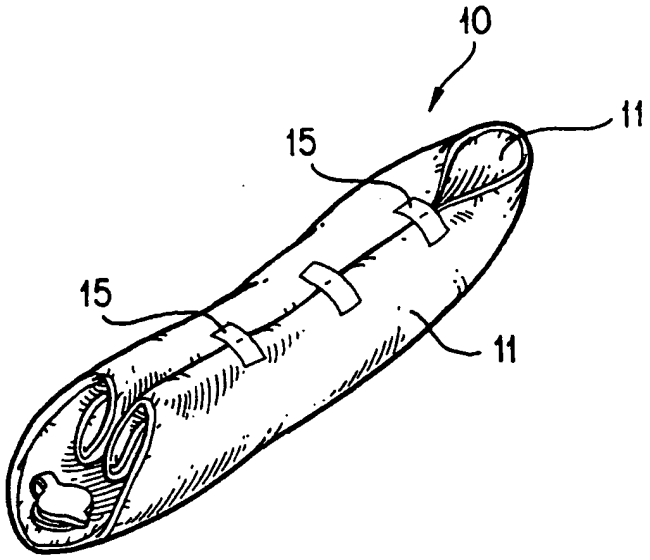

FIG. 2

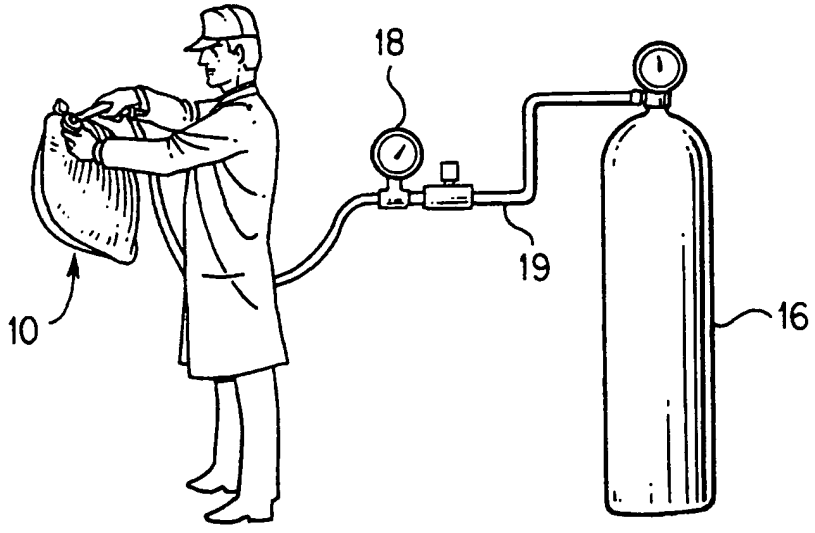

FIG. 3

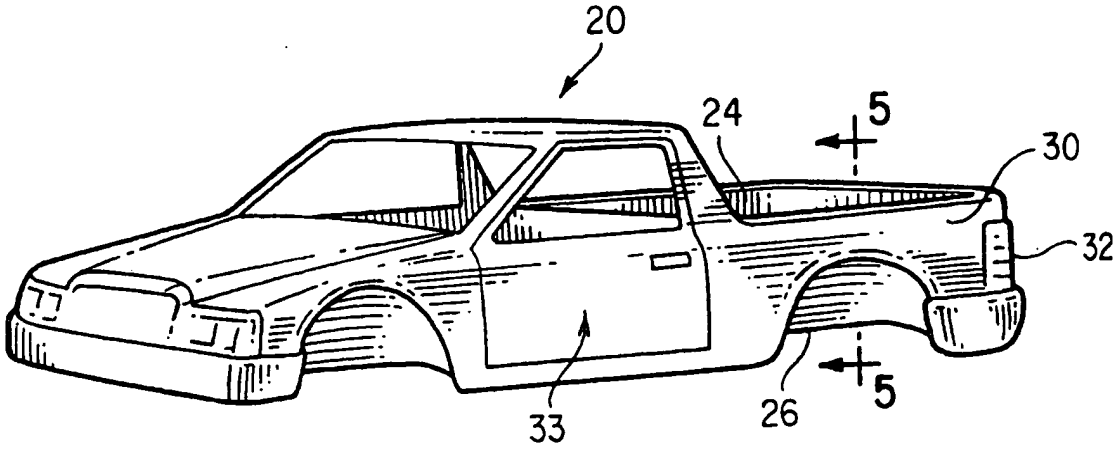

FIG. 4

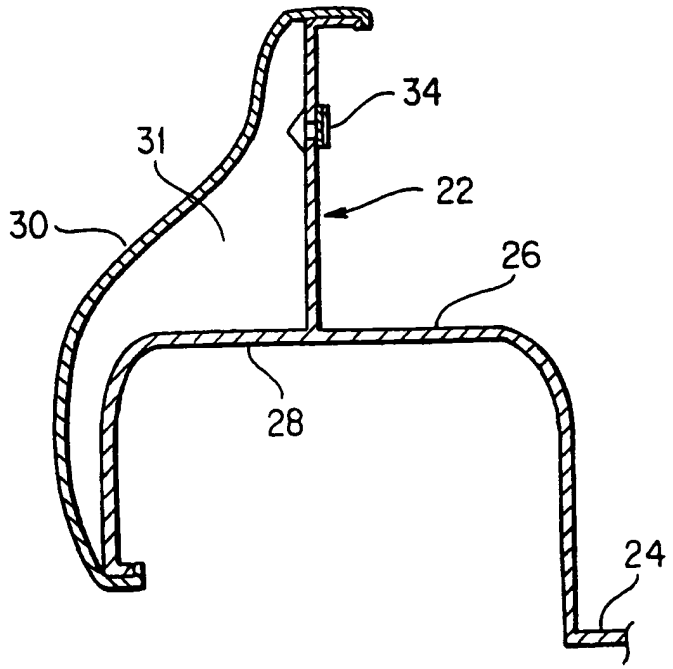

FIG. 5

NOT TO BE CONSIDERED FOR PCT PROCEDURE

FIGS 6 & 7

INTERNATIONAL SEARCH REPORT

Inte ɔnal Application No
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A. CLASSIFICATI N OF SUBJECT MATTER
IPC 6 B60P7/06 B60R13/08

According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B60P B60R B65D

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	see the whole document	10-20
X	EP 0 317 130 A (D.A. PHARO) 24 May 1989	1,2,6-8, 10-13
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A	US 3 939 995 A (R.O. BAXTER) 24 February 1976 see the whole document	1-20
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Date of the actual completion of the international search	Date of mailing of the international search report
5 March 1999	12/03/1999

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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